10/517900
DT05 Rec'd PCT/PTO 10 DEC 2004



# APPLICATOR DEVICE FOR A PRINTING/VARNISHING UNIT IN A PROCESSING MACHINE

## Description

The invention pertains to an applicator device for a printing/varnishing unit in a processing machine according to the preamble of Claim 1. The processing machine is preferably a printing machine with printing units and is preferably combined with at least one varnishing unit or a varnishing machine with at least one varnishing unit.

## Prior art

An applicator unit of this type is known from EP-0 090 179 B1 for preventing roller marks (in the printed result) in a roller unit of a printing machine. Such roller marks result, for example, from jolts that arise in the rotation of the rollers with a plate cylinder having at least one cylinder channel.

In order to guarantee an optimally uniform compressive strain between the plate cylinder and an associated applicator roller, the applicator roller is seated by way of spring-loaded pressure members against an adjacent upstream roller and spring-loaded pressure members are also assigned to this upstream roller. The spring forces of all pressure members are designed such that the bearing play for the applicator roller is shifted to the side facing away from the upstream roller and for the upstream roller to the side facing away from the applicator roller.

The disadvantages here are the relatively high apparatus expense and the insufficient damping behavior at higher machine speeds and/or larger format widths of the material to be printed.

From DE 93 10 713.7 U1, an ink-applicator roller is known that is functionally connected to a printing cylinder with a tension channel, and that rolls over the printing cylinder with high damping and nearly shock-free. To this end, this roller bears an elastic roller coating as an ink-carrying cover layer on a core. In its contour, the roller core has a cutback (recess) associated with the tension channel of the printing cylinder, said cutback being filled by a thickened part of the roller coating. The ink-applicator roller in this case has a completely cylindrical outer surface.

The high manufacturing expense and the fact that the thickened part of the roller coating must always run synchronously with the tension channel are disadvantageous here. Moreover, the attainable damping behavior is insufficient at higher machine speeds and/or larger format widths of the material to be printed.

Problem of the invention

The invention is based on the problem of creating an applicator device of the type mentioned initially which avoids the above-cited disadvantages, which reduces the occurrence of jolts from the passing of a cylinder channel, in particular, and further increases the print quality.

The problem is solved by the construction characteristics of Claim 1. Refinements can be deduced from the subordinate claims.

A first advantage is based on the fact that the applicator device with at least one applicator roller has a markedly damping behavior against jolts resulting form the passage of a cylinder channel. By virtue of the construction of the applicator device, no shocks, or barely negligible small shocks, are transferred into the adjacent roller groups or cylinders. Moreover, the formation of roller strips on the printed product is avoidable, and thus an increase in the printing quality (or varnishing quality) can be realized.

It is also advantageous that the applicator device with at least one applicator roller permit the operation of a processing at increased maximum machine speed, particularly for large formats of material to be printed, without shocks.

An additional advantage is that the applicator device with at least one applicator roller can be used universally on processing machines with at least one printing roller and at least one cylinder channel. The applicator device can preferably be used on inking units, especially offset and/or flexographic inking units. In offset printing assisted by moistening agents, the applicator device can also be used in moistening units. The applicator device can also be used in varnishing and flexographic printing units. In that case, the applicator device is always functionally connected to a printing cylinder or plate cylinder with preferably at least one cylinder channel.

It is also advantageous that the applicator device with at least one applicator roller can be driven, preferably in the inking unit and/or moistening unit, at a speed differing from that of the printing cylinder. Here the applicator roller can be driven nonpositively by the printing cylinder, and the adjacent roller, the friction roller, for instance, can be driven positively.

Finally, it is advantageous that at least one applicator roller of the applicator device comprise a layer that is compressible over the entire periphery of the roller while rolling. In this case, the applicator roller comprises a roller core on which the compressible layer is concentrically arranged adhesively, and a cover layer bearing the material to be processed (ink, varnish, moistening agent) is concentrically arranged adhesively on this compressible layer.

In the passage of a cylinder channel, the thus constructed applicator roller dips into the latter and into the channel edges. Finally, especially, the compressible layer of the applicator roller has a sufficient restoring force so that, after the passage of the cylinder channel, including

the channel start, the basic roller position, particularly the predetermined roller strip (roller placement) can again be assumed on the adjacent printing cylinder.

The compressible layer of the applicator roller consists of a foamed material with cellular structure. The pore diameter of a cell preferably amounts to approximately 0.1-5 mm. The structure can be closed-cell, i.e., the individual cells form closed cavities, or open-cell, i.e., the cells are connected to one another, in form. Alternatively, a foamed material with mixed-cell structure can be used.

Examples

The invention will be explained further on the basis of an embodiment example.

Shown schematically are:

Figure 1, an offset printing unit;

Figure 2, a varnishing unit;

Figure 3, an applicator roller of the applicator unit in cross section.

According to Figure 1, an offset printing unit with an inking unit 3 and, as desired, a moistening unit 4 is shown. Among other items, inking unit 3 comprises at least one roller train having at its end several applicator rollers as ink-applicator rollers 6. Upstream of the ink-applicator rollers 6 are axially changeable and rotationally drivable friction rollers 8.

In the present example, four ink-applicator rollers 6 are in frictional contact with a printing cylinder 1 on the periphery of this printing cylinder 1, constructed here as a plate cylinder. The first and second ink-applicator roller 6 in the direction of rotation of printing cylinder 1 are jointly in frictional contact with an upstream first friction roller 8 and the third and fourth application rollers 6 are jointly in frictional contact with an upstream second friction roller 8.

Printing cylinder 1 has at least one cylinder channel 10 arranged parallel to its axis, for receiving, for instance, tensioning means for the fixation of printing forms. The printing cylinder 1 is additionally in contact with a rubber blanket cylinder 2 and the rubber blanket cylinder 2 is in contact with a pressure cylinder, not shown, such as a sheet-guidance cylinder, which guides the material to be printed.

As needed in, for instance, moistening agent-assisted offset printing, a moistening unit 4 is situated upstream of inking unit 3 in the direction of rotation of printing cylinder 1. Moistening unit 4 has at least one applicator roller as moisture-applicator roller 5 that can be brought into contact with printing cylinder 1 and which is functionally connected to a moistening agent metering system.

According to Figure 2, a varnishing unit, or, alternatively, a flexographic printing unit is shown, having a printing cylinder 1 with at least one cylinder channel 10 and a pressure cylinder 11, such as a sheet-guidance cylinder, that is functionally connected to printing cylinder 1.

The printing unit comprises at least one applicator roller that can be brought into contact with printing cylinder 1; it serves as a varnish-applicator roller 7, which is coupled with a metering system 9 for the medium to be processed (flexographic ink, varnish), for instance, a doctor-blade or roller system.

In Figure 3, an applicator roller 5, 6, 7 (moisture-applicator roller 5, ink-applicator roller 6, varnish-applicator roller 7) is shown in cross section. This applicator roller 5, 6, 7 possesses a roller core 12 (with roller journals arranged at its ends) as support material.

On roller core 12, a compressible layer 13 is tightly adhered concentrically; on it, in turn, a cover layer 14 carrying the actual medium (ink, varnish, moistening agent) is tightly adhered concentrically.

Compressible layer 13 is preferably an open-cell or closed-cell, alternatively a mixed-cell, foamed material. Moreover, compressible layer 13 can be designed to have bubble-shaped or channel-shaped air or gas inclusions.

Cover layer 14 consists of an elastomeric material, preferably a rubber material carrying ink, varnish or moistening agent.

Compressible material 13 formed from a cellular foamed material is arranged firmly adhered to roller core 12, preferably by means of a first vulcanization. For example, sponge rubber can be employed as such a foamed material. Flexible cover layer 14 arranged concentrically on compressible layer 13 is firmly adhered to this layer 13, preferably by means of a second vulcanization.

In the preferred vulcanizations of foamed material (layer 13) to roller core 12, and of cover layer 14 on the foamed material (layer 13), cross-linking reactions occur, so that the tightly adhesive arrangements are formed in each case by an infinitely large network of molecules.

Cover layer 14 is preferably an elastic rubber material with wetting properties that are customary for ink, moistening agent or varnish rollers. Cover layer 14 is preferably an elastic rubber material with a [hardness] quality of roughly 20-40 Shore A.

The layer structure of applicator roller 5, 6, 7 can be configured such that, in a refinement, at least one ply of a fabric or a plastic, such as a film, is additionally arranged firmly adhered between compressible layer 13 and cover layer 14 and/or between compressible layer 13 and roller core 12. Preferably, the ply between roller core 12 and compressible layer 13 is a concentrically arranged barrier layer 15 of, for instance, a rubber material.

In another embodiment, applicator roller 5, 6, 7 is constructed as a casing and can be pulled on and off roller core 12 as a sleeve (not shown). The casing is preferably constructed of metal or plastic. Compressible layer 13 and cover layer 14 are each in turn arranged concentrically, firmly adhered to the sleeve.

In a refinement, at least one ply of a fabric or plastic such as a film is additionally arranged firmly adhered between the sleeve and compressible layer 13 and/or between compressible layer 13 and cover layer 14.

Preferably the ply between roller core 12 and compressible layer 13 is a concentrically arranged barrier layer 15 of, for instance, a rubber material.

Barrier layer 15 serves preferably as an adhesive layer for a better joining of compressible layer 13 to roller core 12 or to the sleeve. Additionally, the uniform arrangement of the air or gas inclusions in the foam material inside compressible layer 13 is supported.

The arrangement of the applicator roller as ink-applicator roller 5 in inking unit 3 is such that at least one of the four ink-applicator rollers 5 is constructed with a compressible layer 13 and the remaining ink-applicator rollers are constructed without a compressible layer 13. In Figure 1, all four ink-applicator rollers preferably comprise the compressible layer 13, which noticeably increases the damping effect.

In another embodiment, at least the first and second (alternatively, the third and fourth) ink-applicator rollers 5 associated with joint friction roller 8 are constructed with a compressible layer 13 and cover layer 14 arranged firmly adhered thereon.

The construction of ink-applicator roller 6 is not limited to an inking unit 3. In another construction, moistening-applicator roller 5 of a moistening unit 4 is constructed with a roller core 12 and compressible layer 13 arranged concentrically and firmly adhered thereto, as well as an elastic cover layer 14 arranged firmly adhered to this layer 13.

For printing units with inking and moistening units 3, 4 a combination of moisture-applicator rollers 5 and ink-applicator rollers 6 with this compressible layer structure, composed of roller core 12, compressible layer 13 and elastic cover layer 14, can be configured for each printing unit.

For varnishing units, varnish-applicator roller 7 can be configured with this compressible layer structure, formed of roller core 12, compressible layer 13 and elastic cover layer 14. A metering system 9 also precedes varnish-applicator roller 7. Metering system 9 is preferably formed by a screen roller in contact with varnish-applicator roller 7 and a chamber doctor blade connected to the screen roller.

Alternatively, varnish-applicator roller 7 is part of a pinch-roller or scoop-roller system.

The functioning is as follows: